Assignment 5

1.

$L = 1.6m$, $R = 0.4m$, $n = \frac{1800}{60}$ r/s, $B = 0.8\,T$

(20) $v = Blu = 0.8 \times 1.6 \times 2\pi \times \frac{1800}{60} \times 0.4 = \underline{108.6V}$ 20

2.

$k = \frac{\text{Chord}}{\text{Arc}} = \frac{2}{\pi}$

$p = 4$, $\phi = 0.02Wb$, $n = 900$ r/min

(a) $V_{rms} = 2.22\, n Z_s \phi p k$

$= 222 \times \frac{900}{60} \times \frac{496 \times 2 \times 2}{2 \times 4} \times 0.02 \times 4 \times \frac{2}{\pi} = \underline{420.5V}$ 20

(40)

(b) $V = 2p\frac{Z}{C} n\phi = 2 \times 4 \frac{496 \times 2 \times 2}{2 \times 4} \times \frac{900}{60} \times 0.02$

$= \underline{595.2V}$ 20

3. $Z = 800$, $A = 400\,cm^2$, $B = 0.8\,T$, $n = \frac{750}{60}$ r/s

(a) $V = \frac{2pZ}{C} n\phi = \frac{2 \times 3 \times 800}{2 \times 3} \times \frac{750}{60} \times 400 \times 10^{-4} \times 0.8 = \underline{320V}$ 5

$T = \frac{1}{2\pi}\left(\frac{2pZ}{C}\right)\phi I$, $I = \frac{P}{V} = \frac{40 \times 10^3}{320} = \underline{125A}$ 5

(40) $T = \frac{1}{2\pi} \frac{2 \times 3 \times 800}{2 \times 3} \times 0.8 \times 400 \times 10^{-4} \times 125 = \underline{509.3Nm}$ 10

(b) $V = \frac{2 \times 3 \times 800}{2} \times \frac{750}{60} \times 0.8 \times 400 \times 10^{-4} = \underline{960V}$ 5

$I = \frac{40 \times 10^3}{960} = \underline{41.7A}$ 5

$T = \frac{1}{2\pi} \times \frac{2 \times 3 \times 800}{2} \times 0.8 \times 400 \times 10^{-4} \times 41.7 = \underline{509\,Nm}$ 10